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UNCLAS SECTION 01 OF 04 PRETORIA 000215

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SUBJECT: NRC STEPS UP COOPERATION WITH SOUTH AFRICA

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B) Pretoria 179  
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Sensitive But Unclassified. Not for Internet.

11. (SBU) SUMMARY: U.S. Nuclear Regulatory Commissioner Peter Lyons used a January 18-24 familiarization visit to South Africa to visit the Pebble Bed Modular Reactor (PBMR) testing facilities and discuss its status; augment cooperation with its counterpart the National Nuclear Regulator (NNR), and visit nuclear sites in South Africa. Commissioner Lyons proposed increased cooperation on security and safety with the NNR and NECSA. PBMR is advancing its pre-licensing process with the NNR, aiming for building a demonstration plant at Koeberg, near Cape Town. The Safari Reactor at Pelindaba has made remarkable progress in converting from use of highly-enriched uranium to low-enriched uranium. Ref A reported on discussions about the Pelindaba security incident and Ref B described Eskom's nuclear new build program and Koeberg nuclear power station. The DOE has separately offered assistance in enhancing security at nuclear and radiological sites in the run-up to the 2010 FIFA World Cup. End Summary.

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National Nuclear Regulator  
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12. (SBU) National Nuclear Regulator (NNR) acting CEO Guy Clappisson hosted a number of meetings for the January 18-24 visit to South Africa of his counterpart NRC Commissioner Peter Lyons and Reactors Technical Assistant Richard Rasmussen. Clappisson joined the visit to the NNR's Cape Town office and Koeberg nuclear power station. Minerals/Energy Officer and/or Specialist accompanied all the meetings.

13. (SBU) Clappisson told Commissioner Lyons that the NNR regulates and licenses Eskom's proposed new nuclear build; Pebble Bed Modular Reactor's (PBMR) new design; the Nuclear Energy Company of South Africa (NECSA), including its site at Pelindaba, medical radioisotope production, and the 20 MW Safari reactor; Northern Cape Vaalputs and various waste and storage sites; and uranium mining and processing. He noted that the Department of Health Directorate of Radiation Control regulates the storage and use of medical isotopes

produced at NECSA. The NNR issues licenses for nuclear plant installation and nuclear vessels, subject to public comment. (NOTE: Energy Officer thanked the NNR in Pretoria and Cape Town for the timely licensing for the visit of the USS Theodore Roosevelt in Cape Town last October. End Note.) NNR does not currently regulate nuclear security - only safety, but it will assume this responsibility after April 1, which will then be comparable to the joint responsibilities of the NRC in the U.S. Clappisson said the NNR made a presentation to Eskom on the licensing process, but was not formally involved in the now-cancelled tender for 3,000 MW new nuclear power plant build (Ref C).

14. (SBU) Clappisson said the NNR has done a lot of work reviewing the design of the PBMR as part of its licensing application for a demonstration plant at Koeberg. From a regulatory perspective, PBMR Qdemonstration plant at Koeberg. From a regulatory perspective, PBMR still has more technical work to complete and must have a customer-licensee to make a formal application to the NNR. Clappisson thought that the Multinational Design Evaluation Program (MDEP) - the IAEA's effort to promote international collaboration on nuclear issues - could be a useful forum to advance the PBMR if a third interested country - like China - would step forward to justify establishment of a working group. (Later in the visit, Clappisson seemed to contradict this statement, questioning the value of the MDEP to advance the PBMR design and licensing.) Clappisson said he still had some technical concerns about the design; for example, he worried about the issue of dust in the reactor, which could have an impact on operation and safety. However, he noted that the dust would be less of an issue if an indirect cycle was used.

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#### Cooperation Opportunities

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15. (SBU) Clappisson described the value of the existing bilateral regulator-to-regulator agreement to share technical information and assist with capability building. NRC Commissioner Lyons offered assistance to share its experience with the licensing of the Westinghouse AP1000. The NNR CEO said they would be eager to accept this if the AP1000 was ultimately selected for South Africa. They discussed the value in sharing ideas on nuclear skills development programs. Clappisson mentioned programs at Eskom, the Nuclear Industry Association of South Africa, and a NECSA program established with Areva. Commissioner Lyons offered to increase cooperation and collaboration with the NNR, specifically citing security, mentioning the October 2007 incident at Pelindaba (Ref A).

Lyons invited the NNR to send a participant to observe force-on-force security inspections in the U.S. He also proposed information-sharing on PBMR research and status. The NNR was receptive to both offers. The DOE has separately offered assistance in enhancing security at nuclear and radiological sites in the run-up to the 2010 FIFA World Cup (Ref E: Embassy recently shared the reftel-provided non-paper with DFA, DME, and NECSA.)

#### National Energy Company of South Africa

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16. (SBU) NECSA CEO Rob Adam briefed Commissioner Lyons on activities at its secure Pelindaba facility one hour west of Pretoria. NECSA hosts the Safari reactor, carries out nuclear fuel cycle research and development - including consideration of recapturing enrichment capacity, and manufacturing medical radioisotopes through its subsidiaries NTP Radioisotopes and Pelchem Ltd. These subsidiaries have fulfilled the SAG's directive to convert the Safari research reactor and associated "hot cell" facilities to a sound commercial basis. NECSA is now a significant producer of the world's radioisotopes, which are very much in demand and subject to limited supply. NECSA/NTP is the world's third largest producer of molybdenum 99, for example, providing up to 20 percent of the world's supply. Pelchem produces fluorochemicals, thereby beneficiating South Africa's significant fluorspar reserves.

¶7. (SBU) Commissioner Lyons raised concerns about the global use of Highly-Enriched Uranium (HEU) in the production of medical radioisotopes, noting in addition that Molybdenum-99 and other medical products have at times faced worrisome shortages. He admitted that the U.S. had not taken steps to establish its own production facilities, so its own demand contributed to the sales of HEU across borders. Adam responded that NECSA's safari reactor is actively converting its production to use of Low Enriched Uranium (LEU), instead of (HEU). The SAG Cabinet recently approved implementing the proposed feasibility study for the return of U.S.-origin spent HEU fuel (Ref D). DOE-NNSA plans to send a technical team in March to advance this important initiative. NECSA Qtechnical team in March to advance this important initiative. NECSA is actively converting the Safari reactor from HEU to LEU in both the active fuel and targets. So far, 16 of 26 fuel rods (62 percent) have been converted to LEU. Only LEU fuel will be loaded into the reactor as of April. NECSA is planning total conversion to LEU targets within five years. NECSA officials also pointed out that it carefully minimizes and manages shutdowns with other producers to assure a secure supply of medical radioisotopes.

¶8. (SBU) Safari Manager Gavin Ball gave Commissioner Lyons a tour of the Safari reactor which carries out radioactive processing for NTP Radioisotopes and Pelchem. The 20 MW Safari reactor was commissioned in 1965 with U.S. support. This support was withdrawn in 1975 because of the illegal weapons program, compelling Pelindaba to eventually become self-sufficient. Commissioner Lyons and his team were able to directly observe the pool reactor's bluish core and stored spent fuel. The Safari facility appeared to exhibit high security features, such as its own high, electrified fence.

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Pebble Bed Modular Reactor

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¶9. (SBU) The Pebble Bed Modular Reactor (PBMR) assembled a robust team to brief Commissioner Lyons on the state-of-play in PBMR's innovative high-temperature, gas-cooled reactor research and design, which aims to be the world's first generation IV nuclear reactor. PBMR officials described the phased pre-licensing process for a 110-400 MW power plant with NNR. They described some of the ambiguities and challenges of seeking to license design and construction of a radically new design with multiple interested agencies on environmental and other issues.

¶10. (SBU) Commissioner Lyons noted that the NRC would only start formal licensing of PBMR if there was an actual U.S. project and client, which would presumably follow licensing in South Africa, or if DOE selected PBMR as the technology of choice for the Next Generation Nuclear Plant project. South Africa, the U.S., and China are the strongest supporters of PBMR technology.

¶11. (SBU) PBMR CEO Jaco Kriek and his team, as well as Eskom's PBMR Manager Frikkie Ellis in a separate meeting, described some of PBMR's challenges and how it is grappling with fundamental decisions on where to go from here. There is a rising perception that PBMR - with its high-temperature gas reactors - could be more quickly applied for industrial process applications, instead of its initial targeting of power plants, as part of South Africa's and other countries' modular, safe nuclear power needs. PBMR is working with coal-to-liquid champion Sasol on this application. Dow Chemical in the U.S. could be another candidate. PBMR is debating direct versus indirect approaches to industrial process applications; in the latter, the nuclear island would be separated by a buffer from the non-radioactive industrial process. PBMR is currently evaluating design options such as the reactor operating temperature and various materials for system components. PBMR aims to make a decision on its initial product configuration by April. In addition, PBMR is still working to finalize a new shareholders agreement between its partners (state Industrial Development Corporation and the Department of Public Enterprises, Eskom, and Westinghouse).

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PBMR Research and Testing Facilities  
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¶12. (SBU) Commissioner Lyons spent most of two days touring PBMR research and testing facilities at Pelindaba and the North West University at Potchefstroom. At Pelindaba, the team visited the Fuel Testing Facility and the Helium Testing Facility. PBMR has succeeded in producing graphite spheres containing thousands of coated fuel-bearing kernels. PBMR is carrying out detailed quality control on the spheres from dropping the spheres from a height to x-ray analysis. The helium testing facility provides a reactor-scale mock-up for testing of a high-temperature, high-pressure helium environment. The facilities at North West University (NWU) include the PBMR micro-model, the high-temperature test unit (HTTU), and the high-pressure test unit (HPTU). The HTTU Qtest unit (HTTU), and the high-pressure test unit (HPTU). The HTTU and the HPTU form the heat transfer test facilities used to support the safety case for the National Nuclear Regulator (NNR). PBMR has worked with NWU to carry out experimental and computer modelling of the developing PBMR system to predict its dynamic behavior. A 165 foot-long "micro-model" of the PBMR has been constructed and tested using an electric heater to emulate the nuclear reactor and off-the-shelf components to serve as compressors, turbine, and heat exchangers. Two large test facilities were constructed to generate detailed design information on the high-temperature heat transfer and high-pressure flow characteristics of gases in various pebble bed configurations, including flows at pebble-wall contact. NWU developed the thermal hydraulic design software known as Flownex to simulate the various design functions of the PBMR.

¶13. (SBU) NRC Commissioner Lyons also visited the Koeberg Nuclear Power Plant (Ref B) and the AngloGold Ashanti Moab Khotsong gold-uranium mine and adjacent processing facility (septel).

¶14. (SBU) COMMENT: Commissioner Lyons' visit was helpful in advancing bilateral cooperation in nuclear safety and security. The Embassy will work with the NRC to follow up on the identified

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collaboration opportunities, especially in security, in light of existing concern about the 2007 Pelindaba incident. Although the visit was not intended to directly advocate for Westinghouse for the evolving post-tender process for new nuclear build in South Africa, it nevertheless showed important USG support to South Africa's nuclear industry vision.

¶15. (U) NRC Commissioner Lyons has cleared this cable.

BALL